IN THE CLAIMS

Please amend the claims as follows:

Claims 1-58 (Cancelled)

59. (Previously Presented) An implantable physiological or pathophysiological biosensor comprising: tissue or cells grown on a chip, wherein the tissue or cells are capable of carrying out a physiological or pathophysiological function, wherein the tissue or cells can be coupled via an electrical interface to an electronic measuring device or an electronic amplifying device, and wherein the biosensor monitors a chemical, physiological or pathophysiological variable associated with an endogenous physiological or pathophysiological function in a mammalian subject.

60. (Previously Presented) The biosensor according to claim 59, wherein the tissue or cells are coupled via an electrical interface to an electronic measuring device or an electronic amplifying device through the chip.

61. (Previously Presented) The biosensor according to claim 59, wherein the tissue or cells are cardiac tissue or cardiac cells.

62. (Previously Presented) The biosensor according to claim 59, wherein the tissue or cells are neuronal tissue or neuronal cells.

63. (Previously Presented) The biosensor according to claim 59, wherein the tissue or cells are molecularly, genetically, or cellularly engineered.

64. (Previously Presented) The biosensor according to claim 63, wherein the tissue or cells are molecularly, genetically, or cellularly engineered to produce a coagulation factor, serotonin, a growth factor, a hormone, or a receptor.

65. (Previously Presented) The biosensor according to claim 64, wherein the growth factor is platelet derived growth factor or vascular endothelial growth factor.

66. (Previously Presented) The biosensor according to claim 59, wherein the physiological or pathophysiological variable is heart rate regulation or heart rate dynamics.

67. (Previously Presented) The biosensor according to claim 59, wherein the physiological or pathophysiological variable is a level or activity of at least one of blood glucose, insulin, thyroid hormone, clotting factors or components, endocrine hormone, paracrine hormone, autocrine hormone, antibodies, receptor antagonists, ligands, antigens, antagonists, signal pathway cofactors, signal pathway components, pathogens, drugs, metabolites, or toxins.

68. (Previously Presented) The biosensor according to claim 59, wherein the biosensor is implanted or inserted in an animal.

69. (Previously Presented) The biosensor according to claim 68, wherein the animal is a mammal.

70. (Previously Presented) The biosensor according to claim 69, wherein the mammal is selected from the group consisting of a mouse, rat, rabbit, pig, cat, dog, cattle, horse, and sheep.

71. (Previously Presented) The biosensor according to claim 69, wherein the mammal is a human.

72. (Previously Presented) The biosensor according to claim 59, wherein the chip with the tissue or cells are incorporated within a device.

73. (Previously Presented) The biosensor of claim 72, wherein the device is at least one of a

tube, tubing, catheter, wire, wire leads, or an electronic pacemaker.

74. (Previously Presented) An implantable physiological or pathophysiological biosensor comprising: in vitro or ex vivo modified stem cells that can be coupled via an electrical interface to endogenous tissue or cells, wherein the in vitro or ex vivo modified stem cells can be implanted into a mammalian subject at a site distant from a natural site for a physiological or pathophysiological function of the subject, and wherein the in vitro or ex vivo modified stem cells can monitor a chemical, physiological or pathophysiological variable associated with the physiological or pathophysiological function of the subject and can produce a coagulation factor, serotonin, a growth factor, a hormone, or a receptor.

75. (Previously Presented) The biosensor according to claim 74, wherein the growth factor is platelet derived growth factor or vascular endothelial growth factor.

76. (Previously Presented) The biosensor according to claim 74, wherein in vitro or ex vivo modified stem cells are molecularly, genetically, or cellularly engineered.

77. (Previously Presented) The biosensor according to claim 74, wherein the physiological or pathophysiological variable is heart rate regulation or heart rate dynamics.

78. (Previously Presented) The biosensor according to claim 74, wherein the physiological or pathophysiological variable is a level or activity of at least one of blood glucose, insulin, thyroid hormone, clotting factors or components, endocrine hormone, paracrine hormone, autocrine hormone, antibodies, receptor antagonists, ligands, antigens, antagonists, signal pathway cofactors, signal pathway components, pathogens, drugs, metabolites, or toxins.

79. (Previously Presented) The biosensor according to claim 74, wherein the biosensor is implanted or inserted in an animal.

80. (Previously Presented) The biosensor according to claim 79, wherein the animal is a mammal.

81. (Previously Presented) The biosensor according to claim 80, wherein the mammal is selected from the group consisting of a mouse, rat, rabbit, pig, cat, dog, cattle, horse, and sheep.

82. (Previously Presented) The biosensor according to claim 80, wherein the mammal is a human.

83. (Previously Presented) The biosensor according to claim 74, wherein the in vitro or ex vivo modified stem cells are incorporated within a device.

84. (Previously Presented) The biosensor of claim 83, wherein the device is at least one of a tube, tubing, catheter, wire, wire leads, or an electronic pacemaker.

85. (Previously Presented) An implantable biologically-based biosensor comprising: tissue or cell contents on a chip, wherein the tissue or cell contents are capable of carrying out a physiological or pathophysiological function, wherein the tissue or cell contents can be coupled via an electrical interface to an electronic measuring device or an electronic amplifying device, and wherein the biosensor monitors a chemical, physiological or pathophysiological variable associated with an endogenous physiological or pathophysiological function in a mammalian subject.

86. (Previously Presented) The biosensor according to claim 85, wherein the tissue or cell contents are coupled via an electrical interface to an electronic measuring device or an electronic amplifying device through the chip.

87. (Previously Presented) The biosensor according to claim 85, wherein the tissue or cell contents are cardiac tissue contents or cardiac cell contents.

88. (Previously Presented) The biosensor according to claim 85, wherein the tissue or cell contents are neuronal tissue contents or neuronal cell contents.

89. (Previously Presented) The biosensor according to claim 85, wherein the biosensor is implanted or inserted in an animal.

90. ((Previously Presented) The biosensor according to claim 89, wherein the animal is a mammal.

91. (Previously Presented) The biosensor according to claim 90, wherein the mammal is selected from the group consisting of a mouse, rat, rabbit, pig, cat, dog, cattle, horse, and sheep.

92. (Previously Presented) The biosensor according to claim 90, wherein the mammal is a human.

93. (Previously Presented) The biosensor according to claim 85, wherein the chip with the tissue or cell contents is incorporated within a device.

94. (Previously Presented) The biosensor of claim 93, wherein the device is at least one of a tube, tubing, catheter, wire, wire leads, or an electronic pacemaker.

95. (Previously Presented) A method of regulating output of a signal, substance, or action in a subject, said method comprising: placing within the subject, exogenous tissue or cells capable of carrying out a physiological or pathophysiological function, wherein the exogenous tissue or cells can be used to monitor a chemical, physiological or pathophysiological variable associated with the physiological or pathophysiological function, and wherein the exogenous tissue or cells can produce a coagulation factor, serotonin, a growth factor, a hormone, or a receptor.

96. (Previously Presented) The method according to claim 95, wherein the growth factor is platelet derived growth factor or vascular endothelial growth factor.

97. (Previously Presented) The method according to claim 95, wherein the tissue or cells are excitable tissue or cells.

98. (Previously Presented) The method according to claim 97, wherein the excitable tissue or cells are cardiac tissue or cells.

99. (Previously Presented) The method according to claim 97, wherein the excitable tissue or cells are neuronal tissue or cells.

100. (Previously Presented) The method according to claim 95, wherein the tissue or cells are molecularly, genetically, or cellularly engineered.

101. (Previously Presented) The method according to claim 95, wherein the physiological or pathophysiological variable is heart rate regulation or heart rate dynamics.

102. (Previously Presented) The method according to claim 95, wherein the chemical, physiological or pathophysiological variable is a level or activity of at least one of blood glucose, insulin, thyroid hormone, clotting factors and components, endocrine hormone, paracrine hormone, autocrine hormone, antibodies, receptor antagonists, ligands, antigens, antagonists, signal pathway cofactors, signal pathway components, pathogens, drugs, metabolites or toxins.

103. (Previously Presented) The method according to claim 95, wherein the tissue or cells are incorporated into a device that is placed inside the subject.

104. (Previously Presented) The method of claim 103, wherein the device is at least one of a tube, tubing, catheter, wire, wire leads, or an electronic pacemaker.

105. (Previously Presented) The method according to claim 95, wherein the subject is a mammal selected from the group consisting of a mouse, rat, rabbit, pig, cat, dog, cattle, horse, and sheep.

106. (Previously Presented) The method according to claim 105, wherein the mammal is a human.